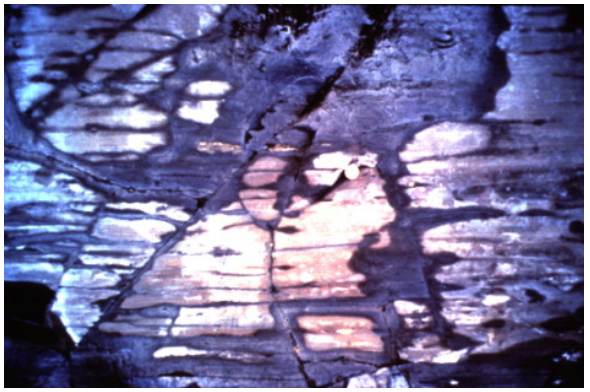
Robert W. Siegfried, II
Unconventional Resources
Technology Advisory Committee
Arlington, VA
June 22, 2007

Annual Plan Outline

- Unconventional Natural Gas and Other Petroleum Resources Exploration and Production Technology
  - Mandate
  - Resource Targets
  - Research Program
- Technology Challenges of Small Producers
  - Mandate
  - Relationship to Small Producer Community
  - Research Program



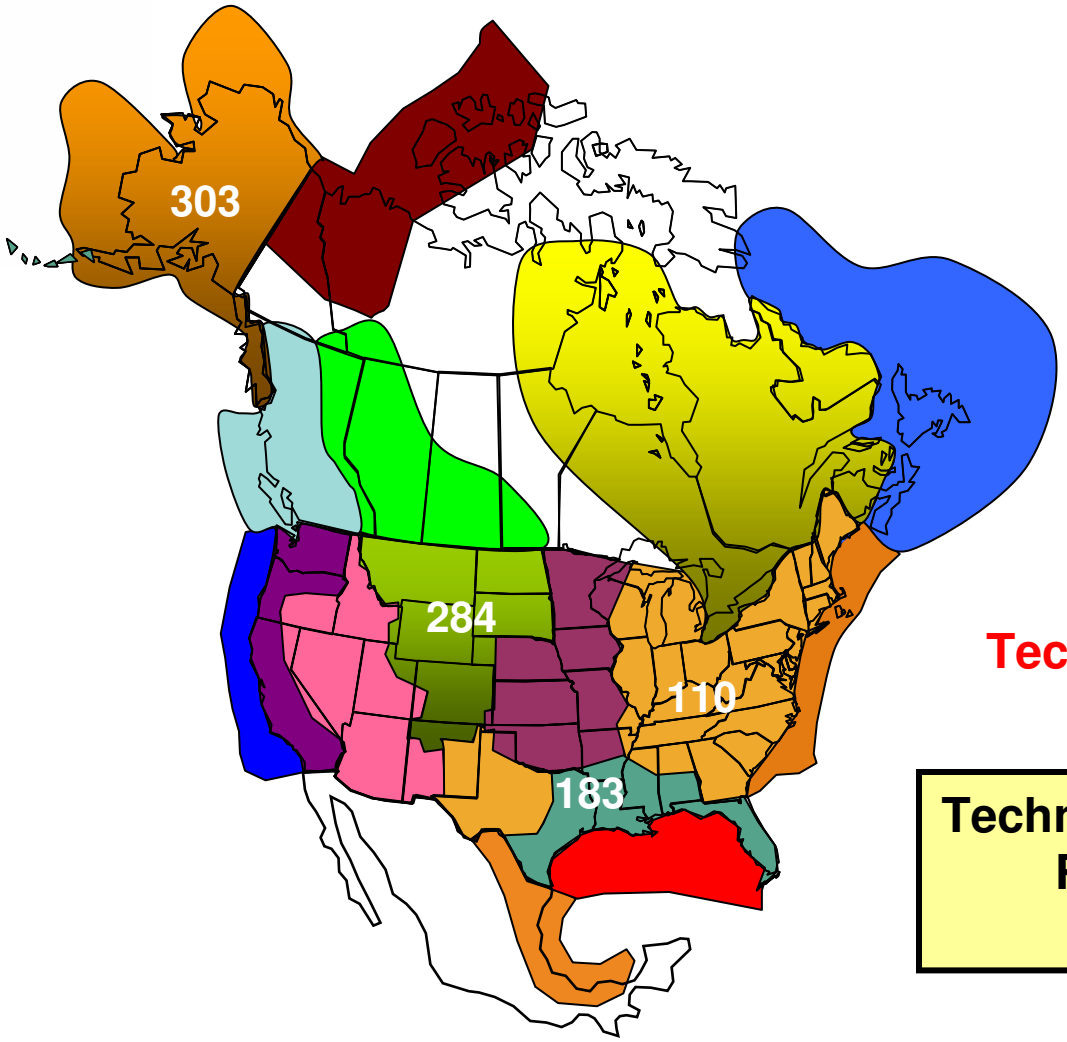
Unconventional Resources

Awards from allocations under section 999H(d)(2) shall focus on areas including

- advanced coalbed methane,
- deep drilling,
- natural gas production from tight sands,
- natural gas production from gas shales,
- stranded gas,
- innovative exploration and production techniques,
- enhanced recovery techniques, and
- environmental mitigation of unconventional natural gas and other petroleum resources exploration and production.

Unconventional ≡ Onshore, Economically Inaccessible

North American Resource Base - Large and Diverse



But . . .

- **Deeper on Land**
- **Tighter Rocks**
- **Unconventional**
- **Deeper in Water**
- **Less Accessible**
- **Heavily Explored**

Technically Challenging!

Technically Recoverable Resource Base 1,969 Tcf

RPSEA Research Partnership to Secure Energy for America

Unconventional Resources – Program Focus

- Energy production per research dollar, minimizing environmental impact
- Shales, Tight Sands, CBM
  - Easy to find, difficult to produce
  - Current industry interest
  - Potential for near-term impact
- Other unconventional resources
  - Longer-term opportunities
  - Crosscutting with ultra-deepwater, e.g. onshore deep gas

Draft Annual Plan Inputs

R&D Planning Event	Date	Description
RPSEA/New Mexico Tech Unconventional Gas Technology Workshops	Summer 2002	Five Workshops Conducted with Independents in Five Regions (San Juan, Permian, Mid Continent, Appalachia, Rockies
National Petroleum Council 2003 Natural Gas Study	Study Conducted During 2002 - 2003	Comprehensive Evaluation of U.S. Natural Gas Resource Base Including Unconventional Gas
DOE Sponsored Unconventional Gas Workshops	Summer 2005	Three Workshops Conducted with Independents (Houston, Denver, Pittsburgh)
RPSEA Member Forums	Conducted 2006 - 2007	Multiple Producer Meetings for Input for R&D programs and Program Structure
RPSEA Program Advisor Committee Meetings	Inaugural Planning Meeting February, 2007	Planning Session where Unconventional Resources and Technology Needs were Identified
Preliminary Input to National Petroleum Council Global Oil and Gas Study	Study to be Completed Early 2007	RPSEA participation on Technology and Unconventional Gas Teams

Unconventional Onshore Themes

- Gas Shales
  - Rock properties/Formation Evaluation
  - Fluid flow and storage
  - Stimulation
  - Water management
- Coalbed Methane
  - Produced water management
- Tight Sands
  - Natural fractures
  - Sweet spots
  - Formation Evaluation
  - Wellbore-reservoir connectivity
  - Surface footprint

Cost Reduction in All Aspects of Operations

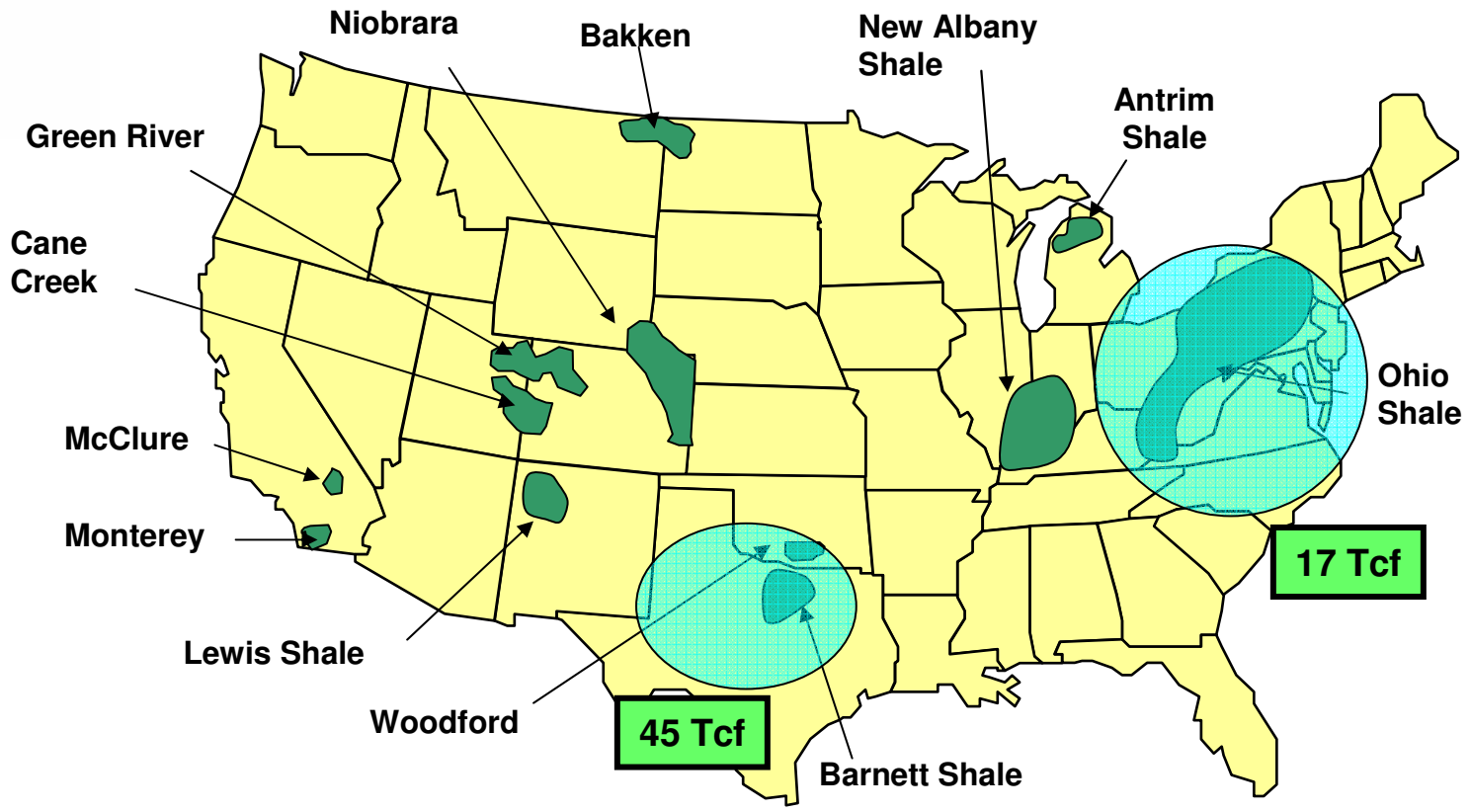
Drill only the good wells!

Unconventional Gas Planning Matrix by Geologic Area

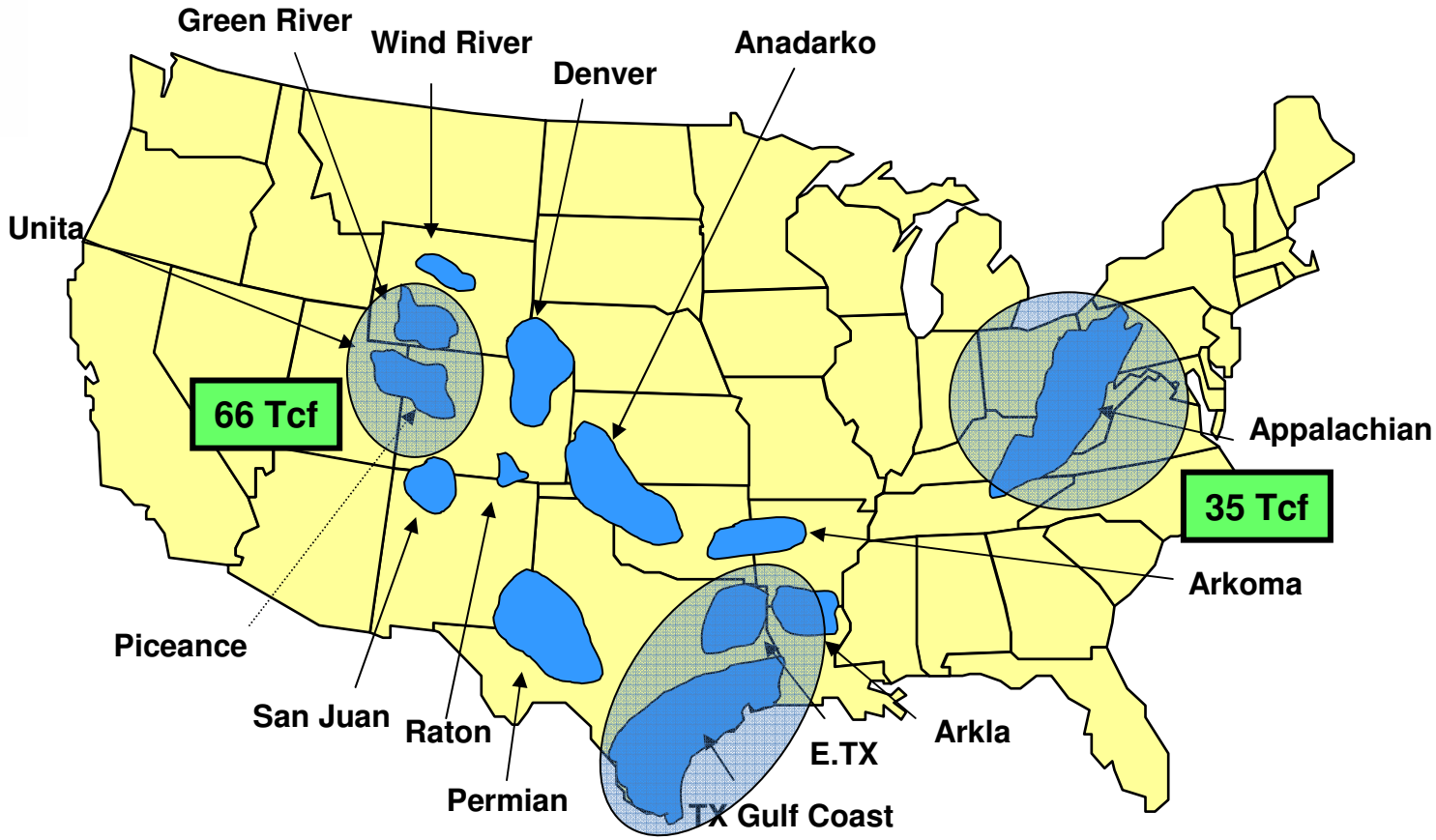
	CBM	Gas Shales	Tight Sands
Existing Play			
45%	San Juan 11	Barnett 12	Green River 11
	Appalachian 8	Appalachian 11	S. Texas 9
			Uinta-Piceance 8
	0	6	7
Emerging Gas Play			
45%	Uinta-Piceance 9	Permian 9	Uinta-Piceance/Deep 8
		Woodford-Oklahoma 5	
		Trenton-Black River 3	
	0	12	1
Frontier Area			
10%	Illinois Basin 4	Permian-Woodford 12	Western Oregon/Washington 7
	N. Mid-Continent 3	Green River 5	
	0	12	2

RPSEA Research Partnership to Secure Energy for America

Shale Gas – 69 Tcf Technically Recoverable



Tight Gas Sands – 159 Tcf Technically Recoverable



"The Technology Challenges of Small Producers"

Awards from allocations under section 999H(d)(3) shall be made to consortia consisting of small producers or organized primarily for the benefit of small producers, and shall focus on areas including

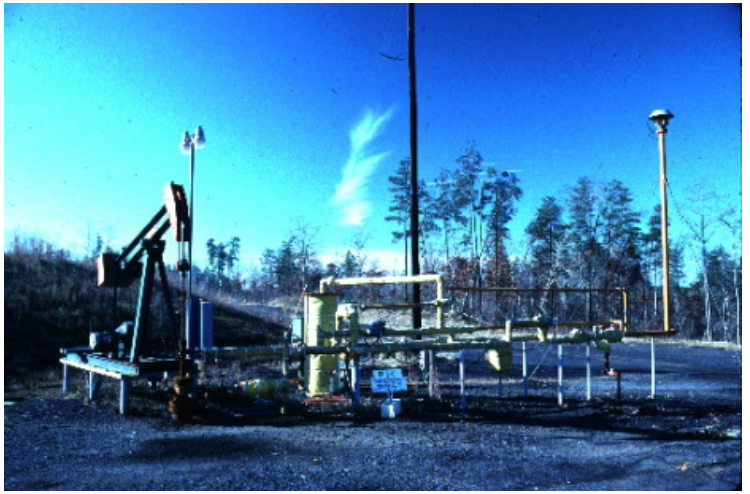
- complex geology involving rapid changes in the type and quality of the oil and gas reservoirs across the reservoir;
- low reservoir pressure;
- unconventional natural gas reservoirs in coalbeds,
- deep reservoirs, tight sands, or shales; and
- unconventional oil reservoirs in tar sands and oil shales.

Small Producer ≡ U.S. Company, ≤ 1000 BOE per day

The Technology Challenges of Small Producers

Focus Area – Advancing Technology for Mature Fields

- Target – Existing/Mature Oil & Gas Accumulations
  - Maximize the value of small producers' existing asset base
  - Leverage existing infrastructure
  - Return to production of older assets
  - Minimal additional surface impact
  - Minimize and reduce the existing environmental impact
- Lower cost and maximize production



Advancing Technology for Mature Fields

- Water Management
  - Produced water shutoff/minimization
  - Produced water treatment and disposal
  - Chemical treatment
- Improved oil and gas recovery
  - Enhanced Recovery Techniques
  - Reservoir life extension
- Reduce operating costs
  - Production operations
- Reduce Environmental Impact
  - P&A
  - Remediation

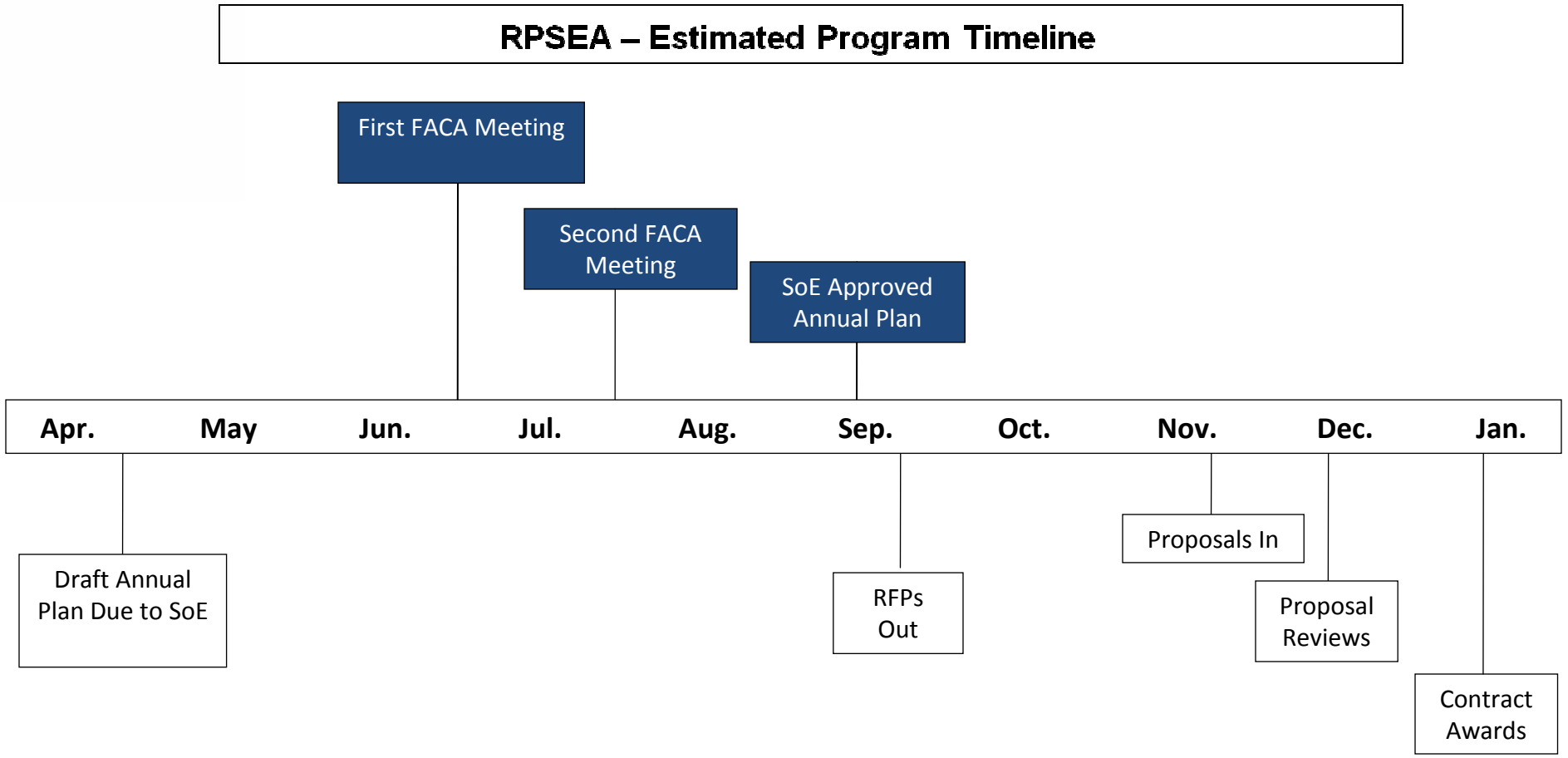
Advancing Technology for Mature Fields

- Field tests of new technology
  - Well-documented
  - Emerging technology
- Data access and management
  - Access to existing data
  - Mining data associated with old fields
    - Create database that attracts new development investment
  - New approaches to using existing data
- Best Practices

Advancing Technology for Mature Fields

- Proposals will be required to tie into a specific application of the proposed technology development
  - Encourage active small producer involvement
  - Facilitate demonstration and commercialization

When Do Things Happen?



Questions?